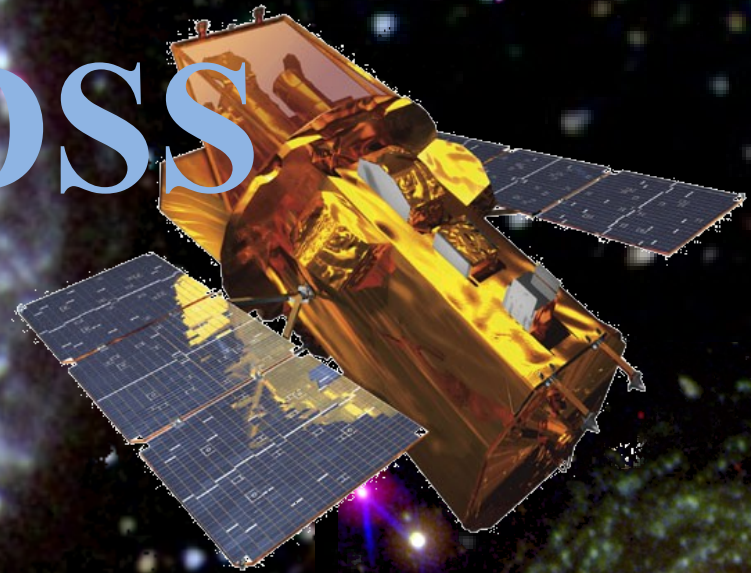# Ultraviolet Properties of Supernovae from Swift/SDSS
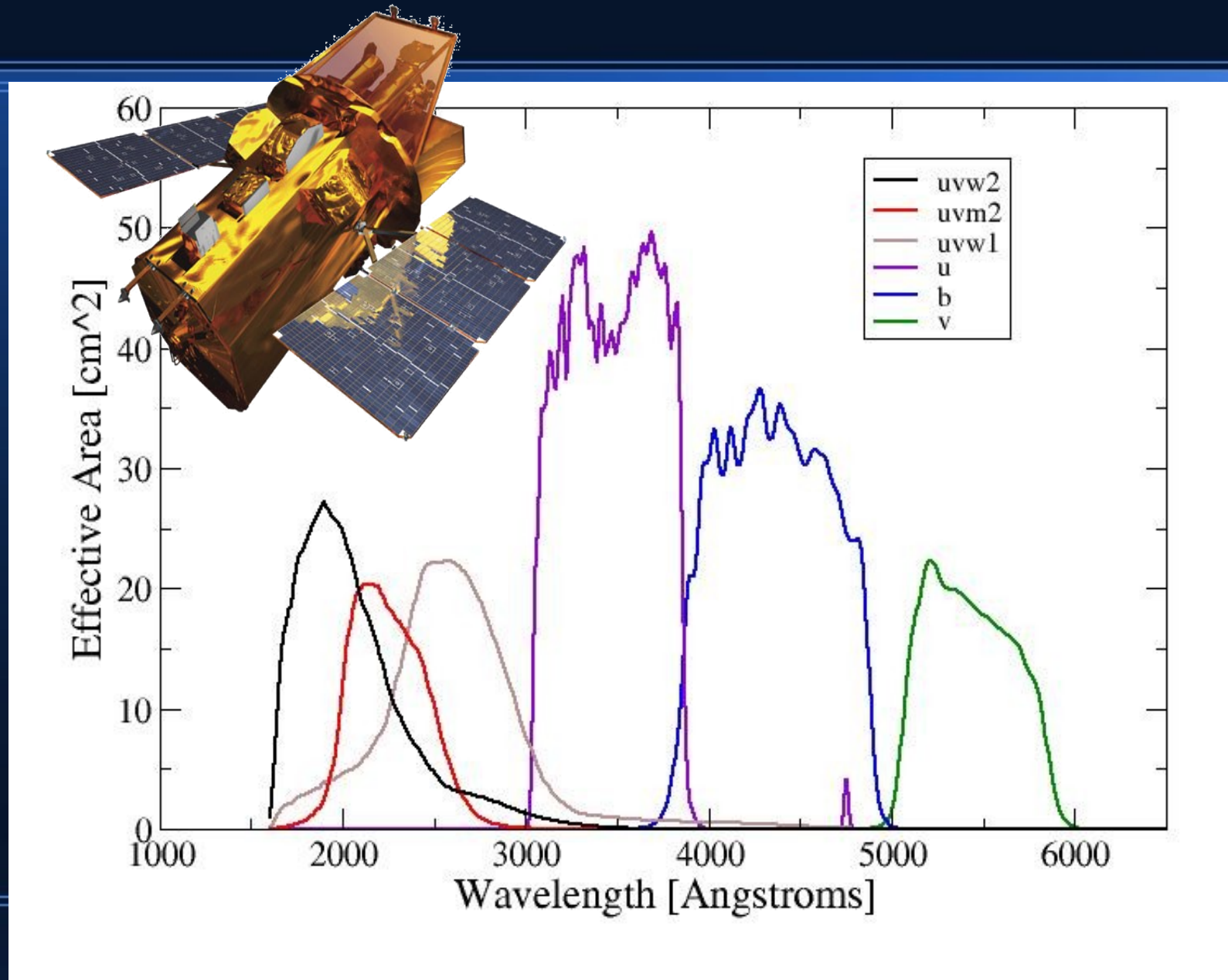
Peter J. Brown

University of Utah

SDSS-II SN Collaboration Mtg

October 25, 2010

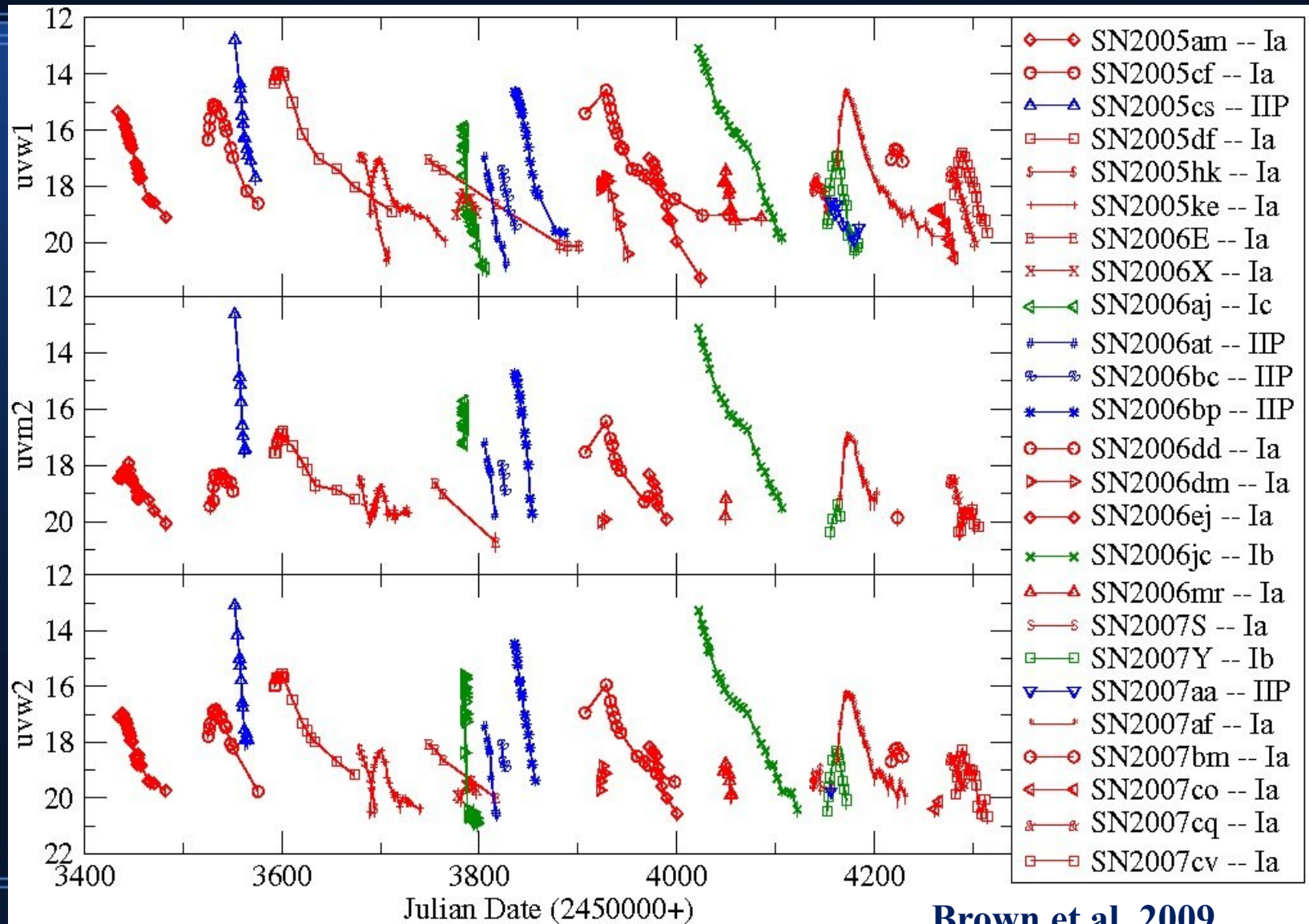# Swift UVOT Filter Curves

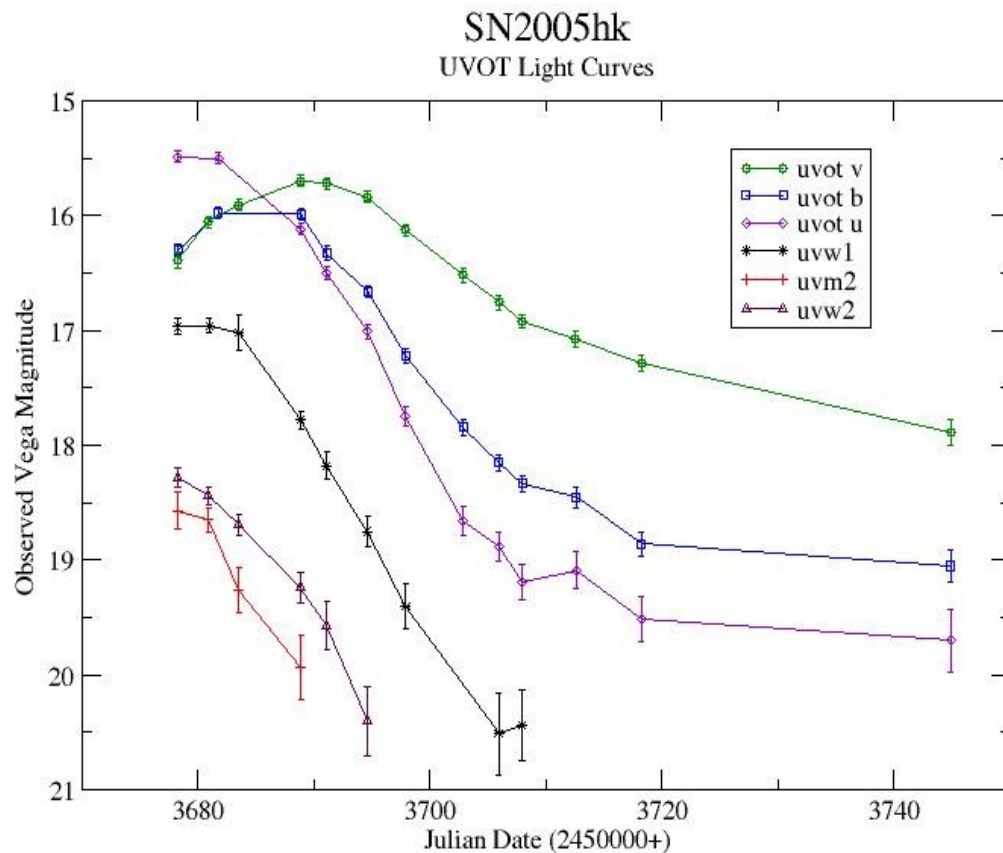# Timeline view of Swift SNe
(first 2 ½ years)

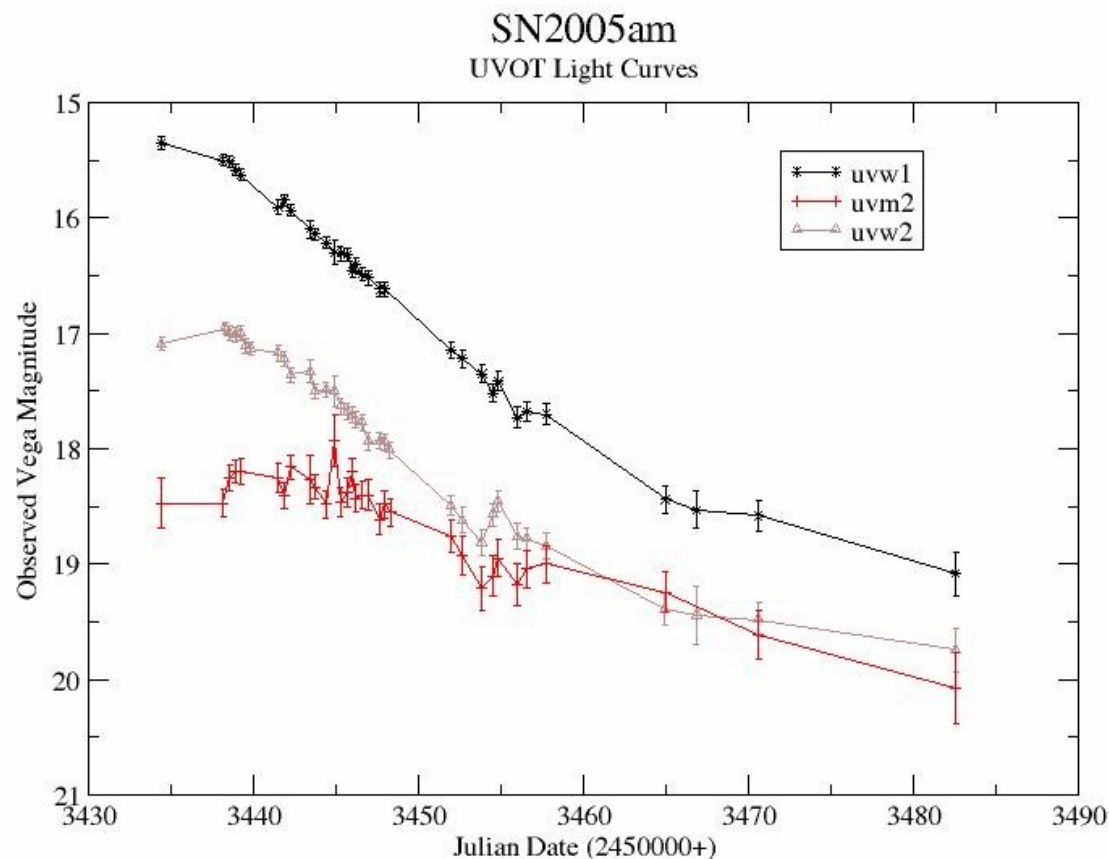Brown et al. 2009

Swift-SDSS SNe

SN2005hk
UVOT Light Curves

- Limited due to the low redshift accessible to Swift UVOT ($z < 0.02$ish)
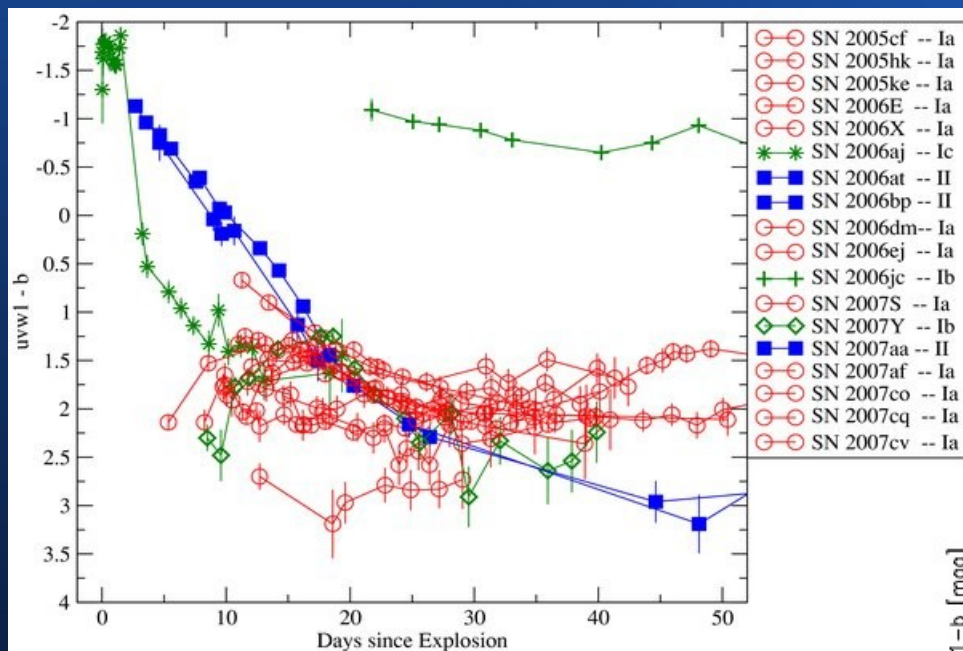
Peculiar SN Ia 2005hk was well observed, showing an early UV peak that faded earlier than the optical (Phillips et al. 2007)

Growing Swift SN Sample

SN2005am
UVOT Light Curves

- Large sample allows comparisons between but also within types -- range of properties, different subclasses, host environments, etc

Brown et al. 2009

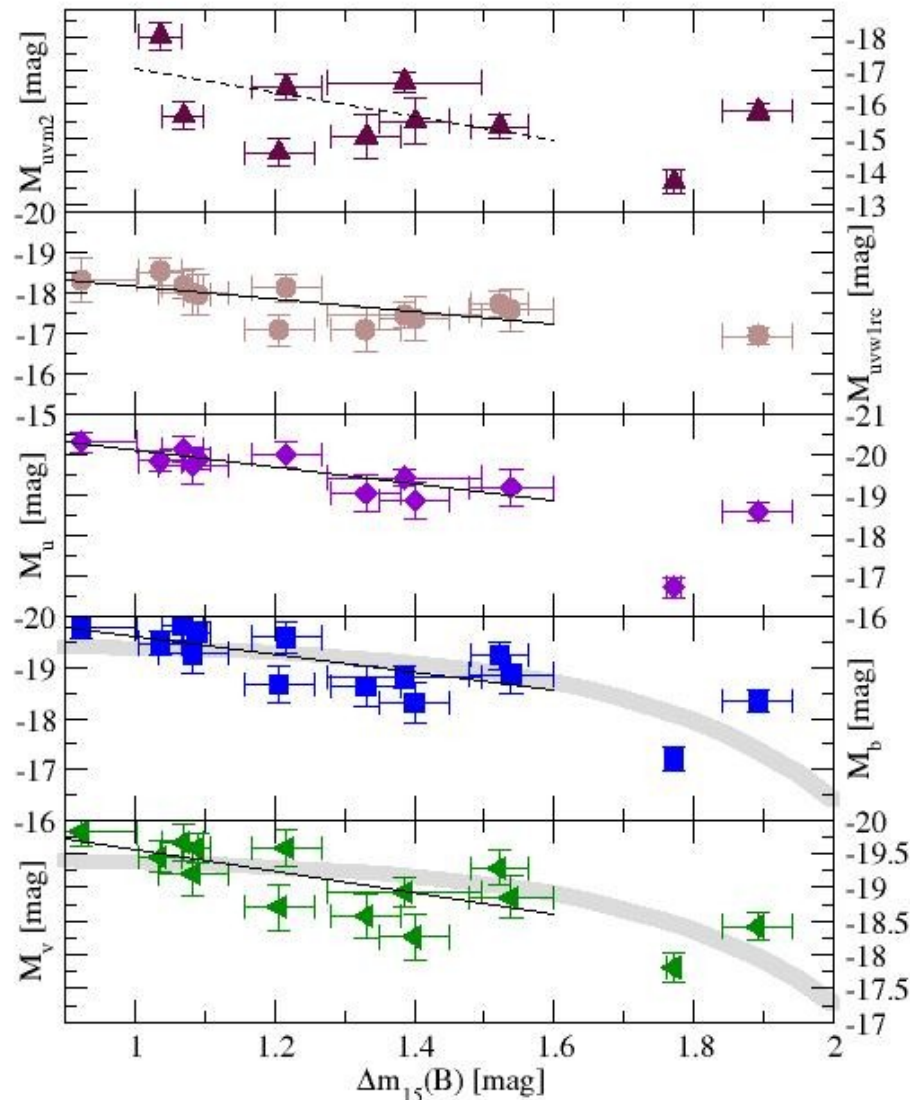# Differentiating SNe by UV colors

- Young SNe II are easily identified by their blue UV colors

  (Brown et al 2009)

- SN Ia subtypes can also be identified by their peculiar UV-optical color evolution (Milne et al. 2010)
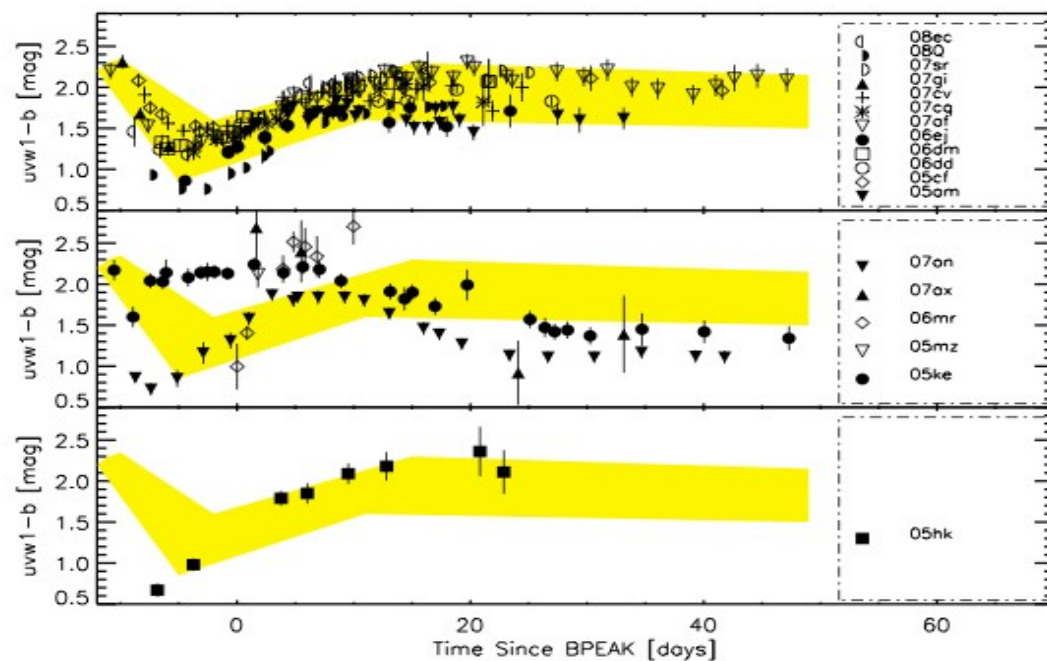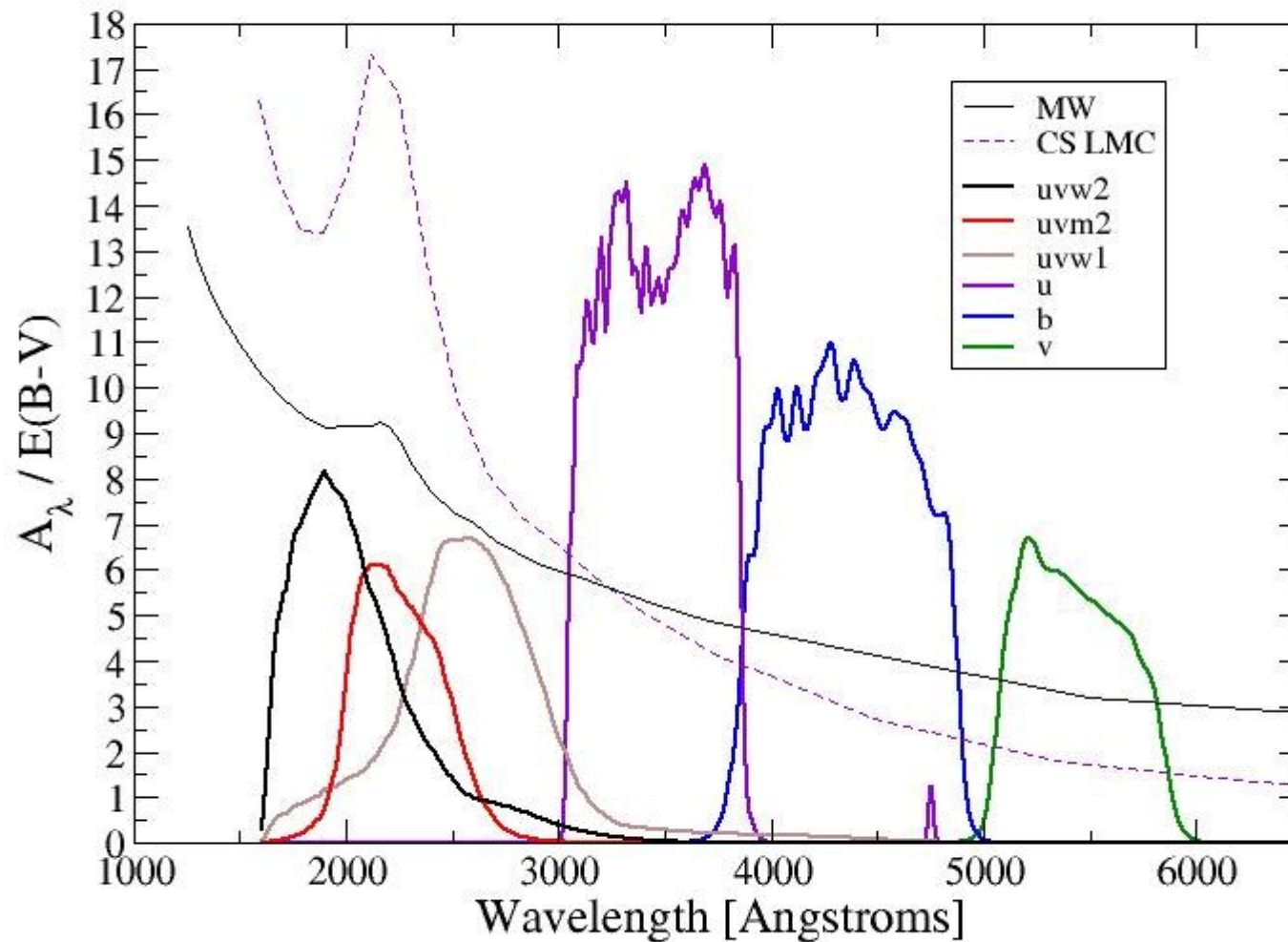
UV Absolute Magnitudes of SNe Ia

- Scatter in optical and near-UV consistent with observational errors (primarily uncertainty in Hubble flow distance for this nearby sample)

- uvm2 absolute magnitudes show evidence for larger intrinsic scatter (Brown et al. 2010)

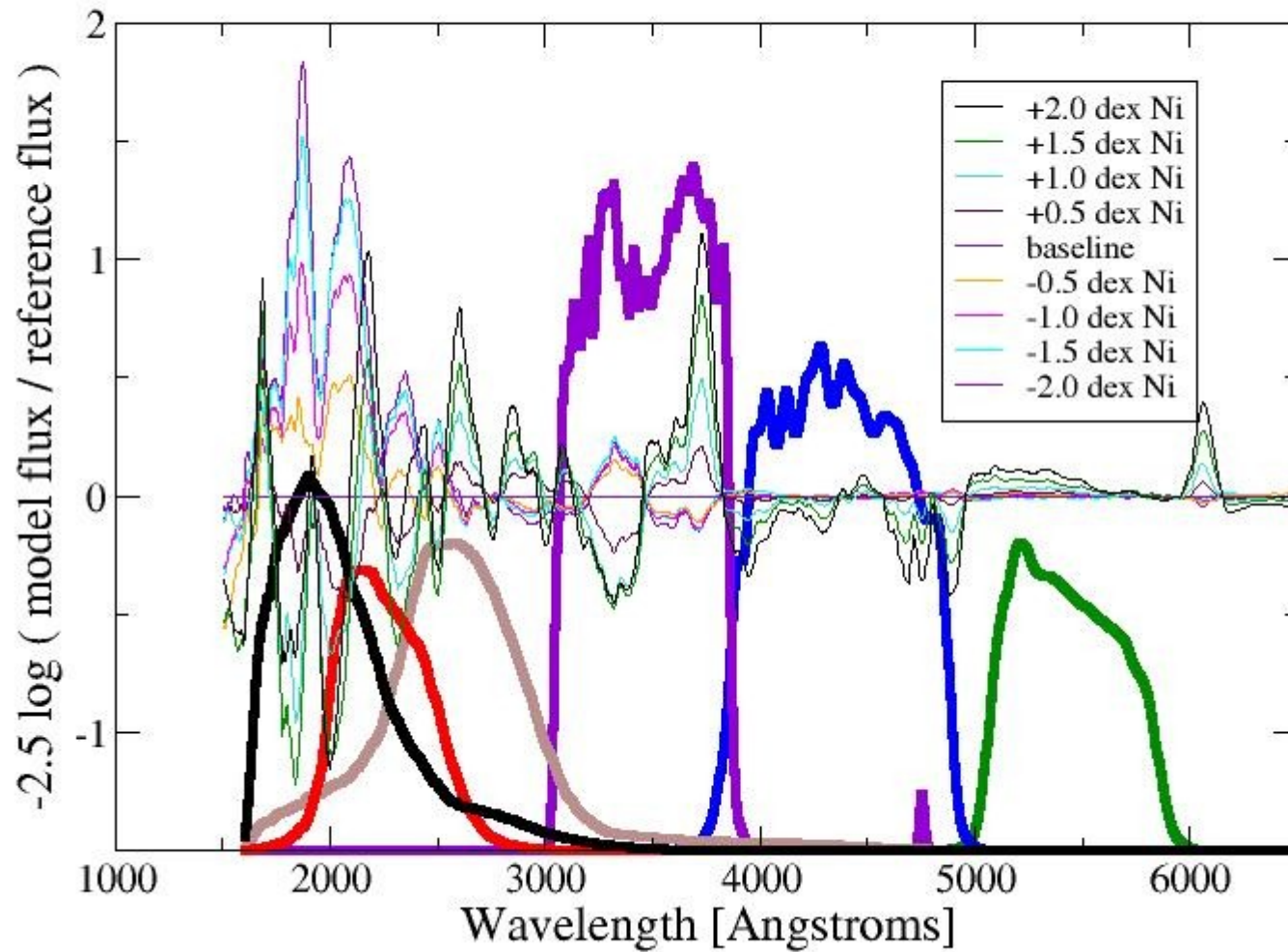# What causes the uvm2 scatter? Extinction? Metallicity?

Effect of heavy element abundances on UV Spectra of SNe Ia
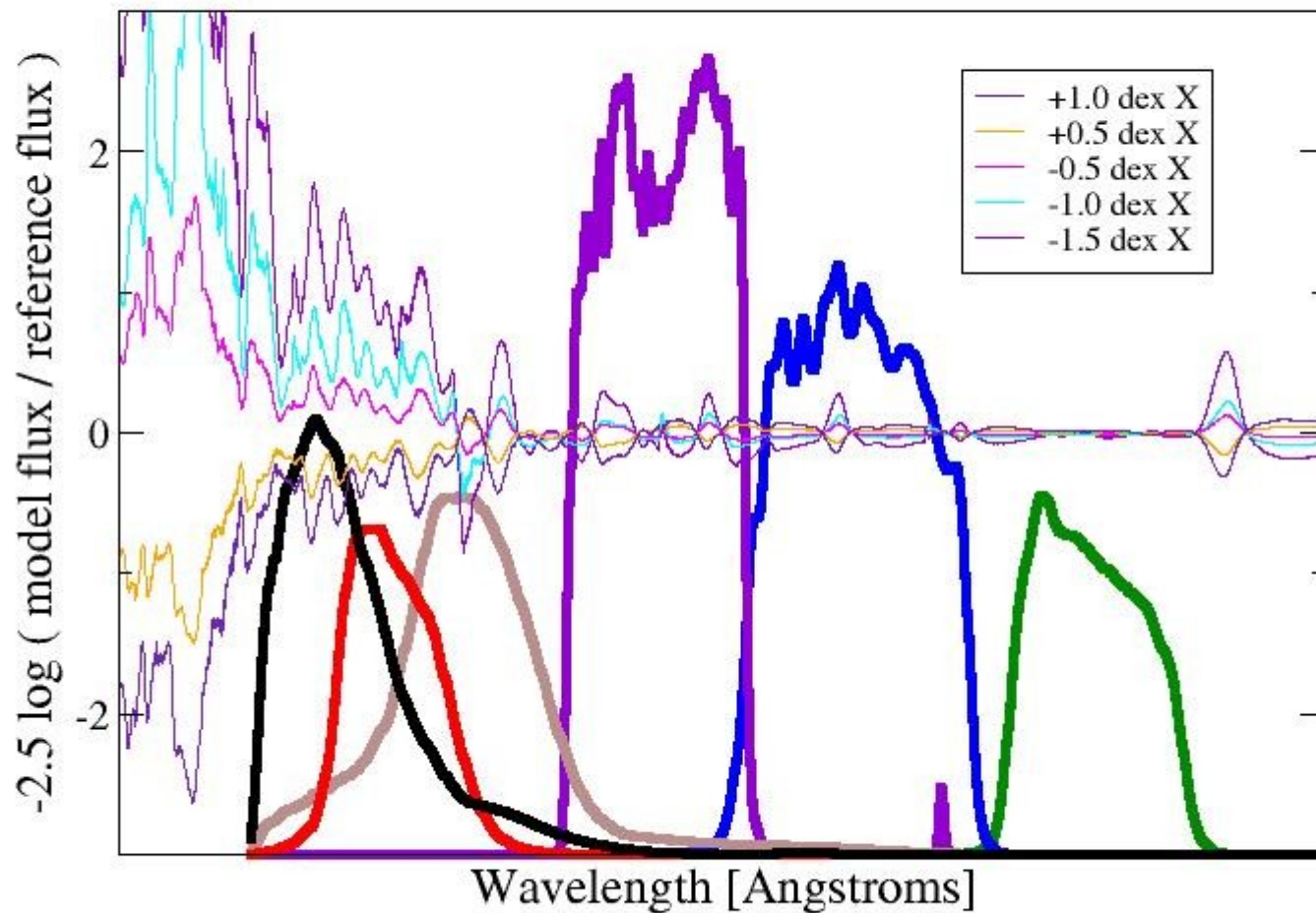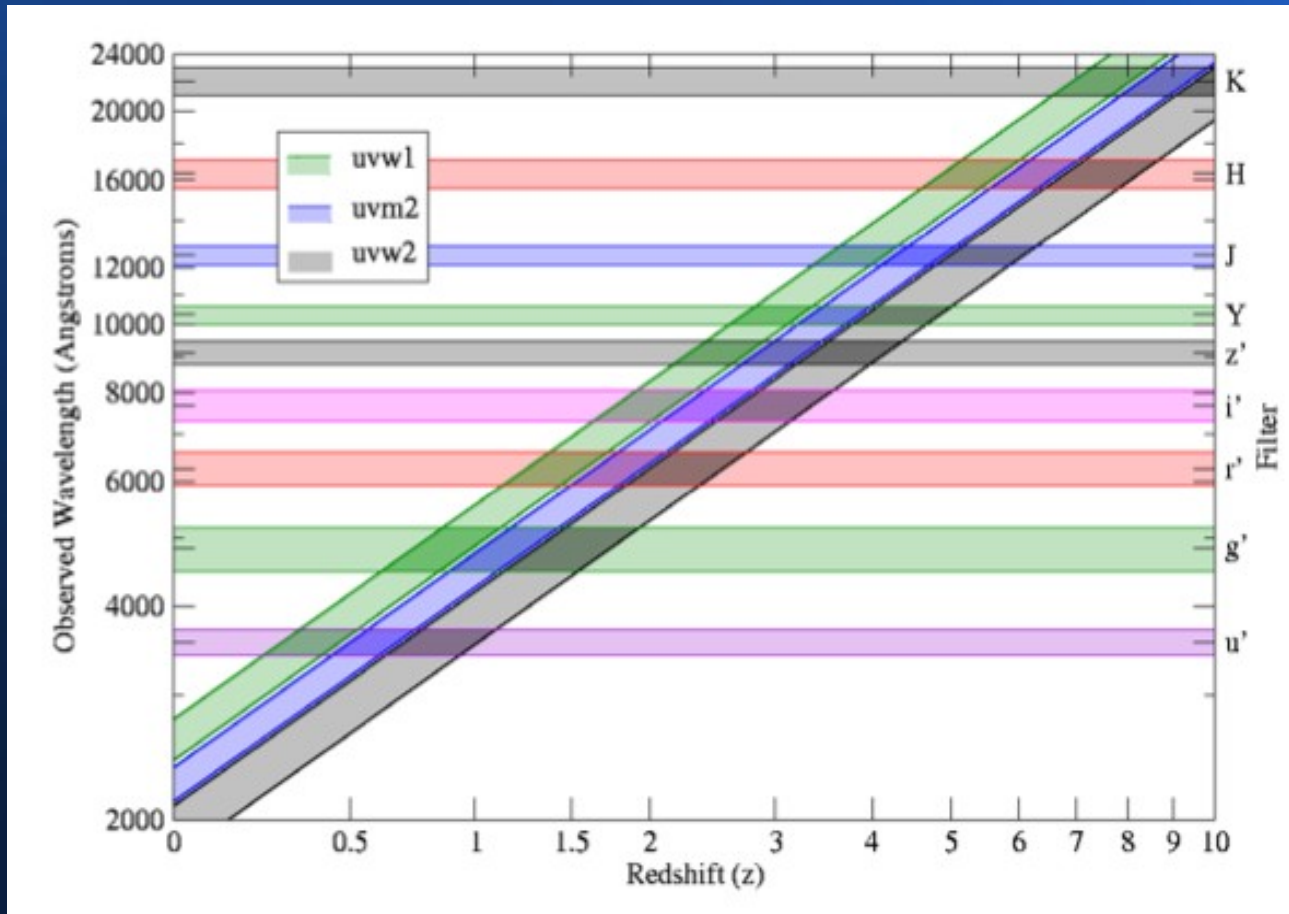

Models from Lentz et al. 2000

Effect of ^{56}Ni abundance on UV spectrum of SNe Ia

Models from Sauer et al. 2008

Near-UV with SDSS II

BOSS redshifts

- Swift SNe provide an excellent low redshift comparison sample
- For higher redshift SNe the u band probes shorter wavelengths
- Sloan u maps to uvw1 at z~0.3-0.4
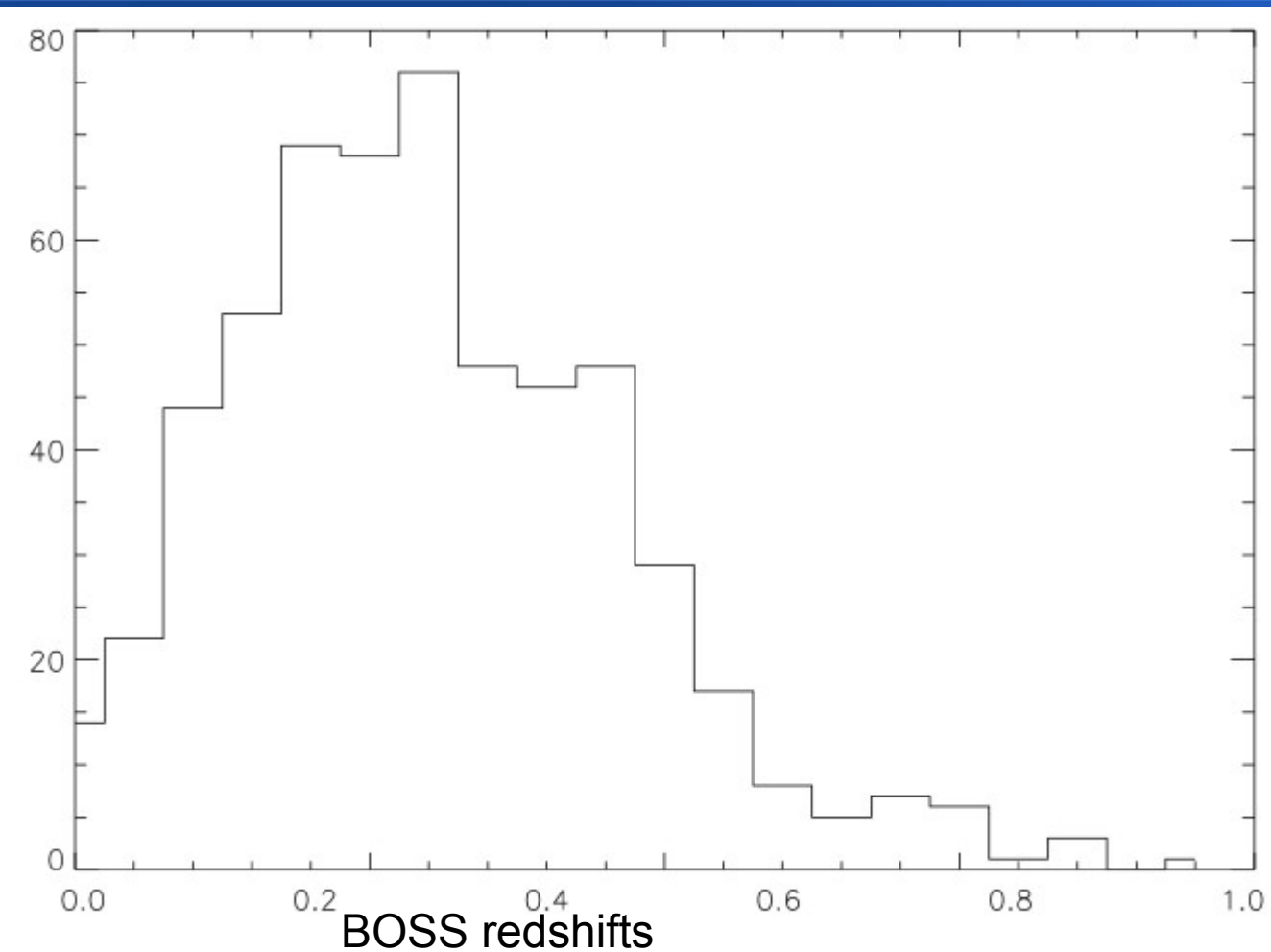-

Near-UV with SDSS II

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-

Comoparisons of Near-UV SEDs, colors, absolute magnitudes

- Local v. z~0.3

- Passive v. star forming galaxy

- Correlations with galaxy properties

- Stacking BOSS spectra for galaxies with similar colors when individual spectra don't have enough signal for detailed analysis

- Stacking BOSS spectra for galaxies hosting SNe of similar stretch and/or color

Differences between low redshift and high redshift SNe in the UV?

- Hsiao templates (with much of UV info coming from higher redshift SNLS SNe) much bluer (more UV flux) than low redshift Swift Sne

- Similar effect seen in low v mid redshift spectra (Foley et al. 2010)

R_U is similar for regular and circumstellar dust